

CLAIMS

1. An airborne long-range laser imaging system, for obtaining an image showing high resolution details of a specific object having dimensions in the order of several meters, comprising:
 - a. A laser source and focal plan array sensing detector, both being mounted on a same gimbals platform;
 - b. A pulse generator for providing a series of pulses to said laser source during a step-scanning period, thereby activating laser illumination by said laser source during each of said pulses, the laser source being characterized in that its illumination beam is so concentrated that it produces illumination spot that covers only a portion of said object;
 - c. A scanning unit for receiving a line of sight direction to said object, and for providing to the gimbals a scanning signal for effecting a stepping-image capturing sequence in such a manner as to scan the object and the area in which said object is included, wherein said area having dimensions in the order of up to a few tens of meters;
 - d. A motion compensation unit for providing to said gimbals, in addition to said scanning signal a motion compensation signal for compensating for the aircraft motion and for the aircraft vibrations;

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- e. A timing unit for:
 - i. Activating, in coordination with the said scanning unit, said pulse generator during the scanning period, in order to produce over the target a plurality of illumination spots, each relating to one of said laser pulses, and wherein each of said spots overlaps at least a portion of one or more adjacent spots; and
 - ii. Activating in a non-gated manner said focal plan array sensing detector during the illumination of the target by each specific pulse in order to capture a plurality of distinct spot-images, each relating to a single illumination pulse;
- f. A memory unit for receiving from said focal plan array sensing detector the captured spot-images, and for storing them;
- g. A correlating unit for correlating images stored in said memory by finding similarity between features of overlapping portions of neighboring spot-images; and
- h. A combining unit receiving information from said correlating unit for combining the spot-images to form a complete image of the scanned area.

2. A system according to claim 1 wherein the degree of overlap is

determined by the speed of scanning movement, and by the rate of the series of pulses generated by the pulse generator.

3. A system according to claim 1 wherein the amount of overlapping between spots is inversely proportional to the distance from the object.
4. System according to claim 1 wherein the gimbals receive a direction signal to the object from an object locating unit, and motion compensation signal from a motion compensation unit.
5. System according to claim 1 wherein the size of the scanning steps is made inversely proportional to the range to the object.
6. System according to claim 1 wherein the width of the illumination beam is in the range of 0.1mrad to 0.4mrad.
7. System according to claim 1 wherein the rate of overlap between adjacent spots is in the range of 10% - 30%.